that other substances besides ozone affect Schönbein's papers, which are not "browned" by the way.

We are glad to see that the organic impurities introduced into the air by the respiration of animals receive due attention, and that the gradual deterioration of health caused by breathing impure air is well insisted on.

The pages on the ventilation of sewers, &c., want re-writing, and the three conclusions all require alteration; they are as follows:—

1. "That no sewers, or drains, or pipes, should run into drains in dwelling houses." This sentence as it stands is too ambiguous to be of any value.

2. "If this be impracticable, all sink pipes or waste pipes should be broken off at least one foot above the trapped grating into which they discharge." The first clause here is unnecessary and even misleading; it would be well left out.

3. "On no account should a cesspool be placed within the walls of a dwelling, but as far as possible from the house." Surely it would have been well here to advise the abolition of these nuisances where not absolutely impracticable, or at any rate their construction of suitable impervious materials.

This is certainly the weakest part of the book, and shows how little such matters are generally understood even yet.

On the other hand the remarks on the relations of filth and disease are excellent: "the negligence of the upper and lower classes of society alike, in these matters, entails terrible calamities on both. The fevers and contagious disorders arising from the neglect of the poor, either on their own or on our part, find their way into the dwellings of all classes, and equally establish disease. The poorer class cannot with impunity live in a state of unnecessary filth and dirt; neither, on the other hand, may the rich without danger neglect the sanitary and physical conditions of the poor around them."

The currents of air produced in rooms by differences in the temperature of various parts should, if classed with winds (the aspirating effect of which latter is not mentioned), be at any rate in a separate subsection; and the law of diffusion of gases does not hold for vapours, and it is certainly not in virtue of it that "the dispersion of vaporous matter" in the air is effected. Otherwise the pages on ventilation are well worth study, and the same may be said of the part devoted to disinfectants, which contains much sound practical information.

The second part of the book, on "the impurities of water and their removal," is decidedly good; some of the best known cases illustrating the connection between polluted water and specimens of cholera and enteric fever are given, and the dangers to be apprehended from the habitual imbibition of impure water (apart from specific diseases) are insisted on; the presence of more than a small amount of chlorides is rightly pointed out as a suspicious circumstance, and the simpler tests for the detection of the various impurities are concisely described; then follows a short account of the methods to be employed for the purification of presumably impure water by means of boiling, filtration, &c., and several of the best household filters are mentioned. Clark's process is, however, only casually alluded to, and not by name.

We are glad to find that the importance of a *continuous water supply* especially to the poorer classes is pointed out. The book before us will, with a small amount of correction, do valuable service if widely circulated, as we have little doubt that it will be. If we have drawn attention to a few defects in it, we have done so because we believe that it is of the utmost importance that popular manuals should contain exact information, and enter as little as possible into disputed points.

W. H. C.

OUR BOOK SHELF

The Coal-fields of Great Britain, &c. By Edward Hull, M.A., F.R.S., &c. Third edition. (London: Stanford.)

THIS new edition of Prof. Hull's well-known work is in most respects a great improvement upon the previous ones. Not only are the coal-fields of Britain itself treated of in more detail, but those of the colonies and foreign countries also come in for fuller notice. The introduction of numerous excellent maps illustrative of the English coal-fields imparts an additional value to the volume, by enabling the reader to grasp at a glance the leading features in the geological structure of the districts embraced. Prof. Hull has, moreover, largely availed himself of the report prepared by the recent Coal Commission, the chief results of which have been embodied in his work. That report, as everyone knows, has calmed the fears of those who saw looming in the near future the exhaustion of our coal supplies and the consequent decline of our industries. It is comfortable to reflect upon the fact that we have still 146,480 millions of tons available within a depth of 4,000 feet, and something like 48,465 millions of tons at a greater depth. From the first of these estimates, Prof. Hull would deduct one-twentieth for coal-seams under two feet in thickness, thus leaving the available quantity of 139,156 millions of tons lying within a depth of 4,000 feet from the surface. Beyond this depth he believes it will not be practicable to penetrate, owing to the effect of increasing temperature and pressure. This, however, is quite an open question. No good reason can be shown why ventilation should not be made effective at a still greater depth than 4,000 feet. If the deeper-lying coal should ever be needed no doubt the engineers of the future will be equal to the occasion and able to render it available. Then, as regards the effect of pressure, we know from actual experience that the "density of coal-seams is not perceptibly greater at 500 or 600 yards than at half that depth." One might almost have inferred as much beforehand, for many of our coal-fields which are now being worked at easy depths must at one time have been covered with thousands of feet of strata, long since removed by denudation; yet the seams in such fields are not denser than those of fields which do not appear to have been covered by such great rock masses. Again, we have heard mining engineers assert that the increased pressure in the deeper pits actually aids in the excavation of the coal, which comes away in larger lumps than would be the case with a similar coal in shallower workings. But whether or not it will ever be necessary to sink deeper than 4,000 feet, there can be no doubt that there is yet abundance of fuel above that limit to keep our furnaces going for many long years to come, and if Britain be destined ere long to retire from her place in the vanguard of nations her loss of prestige will probably be due to other causes than the exhaustion of her mineral resources.

The author expresses himself strongly on the subject of "waste" in working the coal, but not a whit more strongly than is necessary. Everyone who has any acquaintance with British collieries knows how lamentably great this waste is, amounting in some cases to so much as 40 per cent. No doubt, in many of our best conducted collieries waste is reduced to a minimum, but there is still woful

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need for improvement in this matter. It is, of course, impossible for Government to interfere in squabbles about disputed boundaries, &c., and hence jealousy and stubbornness will continue to put considerable areas of coal beyond the chance of being "won." But surely something might be done towards increasing the number of our mining schools; and, as Prof. Hull suggests, the Legislature might establish some educational test without which no one should be allowed to have the supervision of colliery workings. With well-educated managers the waste of coal arising from ignorant methods of working would be checked, and we should hear less frequently of those frightful accidents which ever and anon throw whole mining communities into mourning. J. G.

The Natural History of Plants. By H. Baillon; translated by M. M. Hartog. Vol II. (London: L. Reeve and Co., 1872.)

PURSUING the somewhat erratic arrangement to which we alluded in our notice of the first volume of this work (see NATURE, vol. iv. p. 199), Prof. Baillon proceeds to an account of the small order of Connaraceæ, the three sections of the large order Leguminosæ, viz., Mimoseæ, Cæsalpinieæ, and Papilionaceæ, and then goes off at a tangent to four orders of Incompletæ, viz., Proteaceæ, Lauraceæ, Elæagnaceæ, and Myristacaceæ. The same plan is pursued as in the first volume, of giving first of all a general sketch of the characters of the order, and then dividing it into a number of "series," each containing one or more genera. An immense mass of information is thus collected, though wanting in convenient arrangement. The references to original authorities are, however, commendably copious. The illustrations, as before, are excellent, the translation apparently well and carefully done.

Memorandum des Travaux de Botanique et de Physiologie végétale qui ont été publiés par l'Académie Royale de Belgique pendant le premier siècle de son existence, 1772—1871. Rapport Séculaire per E. Morren. (Bruxelles: Hayez, 1872.)

THOUGH Belgium has not produced any botanical star of the first magnitude, yet a large amount of excellent work has been done in the little kingdom, especially during the period of its independent existence, since 1830, as shown by the labours of Decaisne in the flora of Japan, and of Galeotti in that of Mexico, of Jean Kickx in cryptogamic botany, of Charles Morren in teratology and general morphology, and of Quetelet in the periodic phenomena of vegetation. M. E. Morren's short abstract of the service done by his countrymen in each department of botany, with a list of the dates of publication of the various memoirs, is a useful contribution to the history of the science.

Results of Five Years' Meteorological Observations for Hobart Town.

WE are here presented with carefully constructed tables and valuable remarks on the climate and vital statistics of Tasmania. It includes the results of observations for the five years ending in 1870, with which are incorporated the statistics for the previous twenty-five years, so that it presents us with a complete set of statistics of meteorology for thirty years. That the observations have been carefully and correctly made is proved by the fact that the results of thirty years' observations agree very closely with those of the twenty-five years, the difference in many cases amounting to only a second or third place of decimals. The observations for the five years ending 1870, have been made gratuitously at the Toronto Observatory, by Mr. Francis Abbott, the tables having been constructed by Mr. T. Roblin, Curator of the Museum, and revised by Dr. E. Swarbeck Hall, who appends an elaborate and carefully drawn up health report for Tasmania. The introduction, among other matters, contains a descriptive list of the various instruments used; the set seems to be complete, and all the apparatus trustworthy. The following are the mean resultants from the thirty years' observations for Hobart Town from 1841 to 1870 inclusive:—Barometer (at temperature 32°), 29·580. Thermometer, mean temperature, 54·72; mean diurnal range, 17·91; mean solar intensity, 93·39; mean terrestrial radiation, 43·01. Humidity of air—Dew point—mean position, 45·49; humidity of air, ·75; elastic force of vapour, ·316; condensation, rain in inches, 1·89; number of days on which rain fell, 11·66; Ozone, mean daily amount, 7·24; prevailing direction of wind, N.W., S.E.; prevailing force of wind, 58·37 lbs. per square foot.

Jahrbuch der k. k. Geologischen Reichsanstalt, xxii. band, No. 2. (Wien.)

FRANZ RITTER V. HAUER gives, in this number of the Year-book, an outline sketch of the sedimentary formations met with in Austria. He arranges his materials somewhat after the manner of Studer's "Index der Petrographie," the names of the various deposits following in alphabetical order. The geological horizons are briefly indicated, and copious references to authorities are given. The descriptions are necessarily brief, but they are clear and comprehensive, and the paper will be invaluable to those who may desire to widen their acquaintance with Austrian geology. Among the mineralogical contributions, we notice the description of a new mineral from Mexico—*Guadalcazerite,* the composition of which is given as $6\ H_g\ S + Z_n\ S$. From the laboratory of Prof. Bauer come several useful rock-analyses, chiefly ironstones. Professor Tschermak gives a description of sundry meteorites, and some account of basalts, metaphyres, and other eruptive rocks from the Caucasus. There is also an interesting paper by Professor Inostranzeff on the Vesuvian lavas of 1871 and 1872.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. No notice is taken of anonymous communications.*]

Prof. Balfour Stewart on the Spectroscope

I BEG to say a few words in reply to some statements in the letter of Prof. Balfour Stewart in NATURE, February 20.

1st. I wish to state that I had no knowledge of Mr. Proctor's letter in the *English Mechanic* until I saw it by accident in a copy of that journal which had been sent to me for another matter. I have never made the claim to which Prof. Stewart refers.

2nd. The note in Schellen's "Spectrum Analysis," of which Prof. Stewart asks an explanation, consists of three statements of fact.

α "Though to Mr. Lockyer is due the first publication of the idea of the possibility of applying the spectroscope to observe the red flames in sunshine, as a matter of history it should not be passed over that about the same time the same idea occurred independently to Mr. Stone, of Greenwich, and to Mr. Huggins." I wish to remark that I made no claim on Mr. Stone's part or on my own. On the contrary I said expressly "*as a matter of history*" these facts should not be passed over. I conceive that this statement of facts ought to have a place in a book which professes to give the history of the subject.

β "These observers were, however, unsuccessful in numerous attempts which they made to see the spectra of the prominences, for the reason probably that the spectroscopes they employed were not of sufficient dispersive power to make the bright lines of the solar flames easily visible." Prof. Stewart remarks that he "cannot yet understand" why I failed. The reasons can now be a matter of conjecture only. All workers in science know how much more difficult it is to discover the unknown than to recognise the known. It may be that I passed over too carelessly the deep red (C) and the blue (F) where the brightest lines occur. The observation of the bright lines in the star in Corona B (May 1866), in which the same sifting principle of the prism came into operation, should have suggested to me to look for the lines of

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